UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

75 Hawthorne Street

San Francisco, CA 94105

July 7, 2016

Mr. Anthony R. Brown
Environmental Manager
Atlantic Richfield Company
4 Centerpointe Drive, LPR 4-435
La Palma, CA 90623-1066

Subject: EPA Comments on Focused Feasibility Study Revegetation Treatability Study Work Plan, Leviathan Mine Site, Alpine County, California Leviathan Mine Site, Alpine County, California, dated June March 31, 2016.

Dear Mr. Brown:

The U.S. Environmental Protections Agency (EPA) has reviewed the Focused Feasibility Study Revegetation Treatability Study (RTS) Work Plan, Leviathan Mine Site, Alpine County, California Leviathan Mine Site, Alpine County, California, dated June March 31, 2016; prepared on behalf of the Atlantic Richfield Company (ARC) by AMEC.

This work was submitted to EPA pursuant to Administrative Order for Remedial Investigation and Feasibility Study, Leviathan Mine, Alpine County, California (CERCLA Docket No. 2008-18, June 23, 2008).

Background: Revegetation efforts at Leviathan Mine include studies in the 1970s by University of Nevada Reno graduate students (Butterfield 1977, Everett and others 1980). The California Regional Water Quality Control Board, Lahontan Region (Regional Board) implemented revegetation at Pond 1, Pond 3, and the Pit in the mid-1980s. Regional Board revegetation efforts were assessed by the State Water Resources Control Board (1991), and collaboration with UC Davis personnel to identify a sustainable revegetation strategy was started in 1997 (Claassen and Hogan, 1999). The California Department of Conservation (CDOC 2000) prepared a revegetation plan based on the work of Claassen and Hogan. Subsequent implementation of the CDOC 2000 plan occurred in 2002.

RWQCB notes: The circa 2000 Delta Slope Plot location was excavated, regraded, amended with lime and compost, and seeded during the Delta Slope stabilization efforts conducted in 2005

EPA issued an Administrative Order for Remedial Investigation and Feasibility Study, Leviathan Mine, Alpine County, California (CERCLA Docket No. 2008-18, dated June 23, 2008. The RI/FS SOW attached to the June 2008 UAO provides for evaluating the biological effects of the waste on revegetation efforts (Page 8), and evaluation of optimal slopes for minimizing erosion and facilitating revegetation efforts (Pate 13). Atlantic Richfield's final 2009 Programmatic Work Plan (PWP) acknowledged revegetation as a

technology to be considered in the FS. ARCs August 2010 On Property FRI Work Plan identified characterization of mine waste and floodplain soils to evaluate the revegetation potential (Sections 5.0, 5.1.3, 5.1.4, and 5.3.2,).

Through UC Davis, Vic Claassen evaluated the earlier revegetation efforts during 2013, and then implemented investigations and new test plots to identify revised methods for achieving a sustainable revegetation strategy (Claassen 2015)

ARC's March 31, 2016 work plan was prepared to guide implementation of a revegetation treatability study (RTS) to develop cost and performance data for use by ARC in evaluating revegetation as a component of remedial alternatives for the feasibility study. The work plan envisions providing proof-of-concept for techniques to establish a viable and self-sustaining plant community on mine waste, and examining the effectiveness of vegetation on mitigating the vertical movement of shallow subsurface water.

EPA has completed its review of the March 31, 2016 Revegetation work plan, and provides the following comments:

- **G1: Both flat and Sloped Areas:** The work plan provides a good description for conducting the proposed revegetation treatability study. However, the work plan appears to have a bias toward revegetation of flat areas in preference to sloped areas. It is unclear from the discussions of sloping areas in Section 3.2.3, that flat and sloping areas will be given equal attention with respect to revegetation efforts. For example, the second paragraph of Section 3.2.3 on page 10 emphasizes control of infiltrating water over erosion control. Both water management and erosion control are important benefits of revegetation. Please revise the document to clarify that steeply sloping areas at the site will also be revegetated and extent of any necessary grading.

- **G2: Pilot on Steep Slopes:** As necessary to provide information to support the FS, please expand the RTS to include a test plot on steep slopes at the site. Alternatively, ARC should discuss the need to regrade steep slopes to facilitate future revegetation efforts as part of future remedies. Some of the overburden slopes remain at very steep angles and prevent a robust revegetation program due to their instability. The potential for regrading slopes greater than 30 percent to create favorable conditions for revegetation should be evaluated as a component of the Feasibility Study and should be stated in this section for additional clarification.

Specific Comments:

- **S1: Section 5.1.5.2 Liming, 2nd Paragraph-** The text states that lime will be applied to the top 2 to 3 feet, however the UC Davis Report (Claassen 2015) recommends applying the lime to depths of 3-4 feet. Please revise the workplan to apply lime to 3-4 feet consistent with the UC Davis Report (Claassen 2015) findings to support increased root depth.

- **S2: Section 5.1.5.2 Liming -** The text states the lime application rate has yet to be determined. Yet, the Appendix A of the UC Davis Report (Claassen 2015) identifies site specific lime application rates. Please provide the lime application rate.

- **S3: Section 5.1.6 Plant Selection and Development of Planting Strategies -** The text states that both native plants and introduced species will be selected for the test plots. A federal regulation that expresses a desire for native plants but provides for use of introduced plants is cited (Surface Mining Control and Reclamation Act or SMCRA). The California Surface Mining Reclamation

Act (SMARA) should also be referenced and considered. In particular Article 9 Reclamation Standards, § 3705 Performance Standards for Revegetation (g) states that :

> "Native plant species shall be used for revegetation, except when introduced species are necessary to meet the end uses specified in the approved reclamation plan. Areas to be developed for industrial, commercial, or residential use shall be revegetated for the interim period, as necessary, to control erosion. In this circumstance, non-native plant species may be used if they are not noxious weeds and if they are species known not to displace native species in the area."

Per California regulations, native plant species should be used at a site such as Leviathan Mine where a plan identifying industrial, commercial, or residential use has not been adopted. Please use native plant species such as those identified in *Table 1- Plant Species Common To All Survey Areas* found in Appendix A of the UC Davis 2015 Revegetation Study. (See Attachment A) These plants are genetically adapted to the area of Leviathan Mine, and seed could be collected from on-site species and propagated for site-specific seed production. This would ensure seed used at the site is coming from species that are genetically adapted to existing site conditions. This would also minimize the likelihood that revegetation activities would introduce non-native species.

Additionally, please include the addition of container plants to help generate immediate coverage. The table in Attachment A provides a list of container plants for use on steep slopes. Given the short duration of the study (two seasons), seed broadcast alone may not provide to provide useful results. For steep slopes, container plants have the potential for quick establishment to support slope stabilization.

Prior to planning the use of introduced species, ARC should consult with US Forest Service, California Native Plant Society (CNPS) and the Regional Board to ensure that use of any introduced non-native species for the Revegetation Treatability Study (RTS) is acceptable.

S4: Section 5.4 Task 4 Data Evaluation and Reporting - Please develop and include criteria for desired percent coverage of native species and desired diversity of native species based on vegetation surveys in local areas outside of the area disturbed by Leviathan Mine. EPA recognizes that this short term RTS is not expected to achieve such goals, ARC must develop percent cover and diversity measurement endpoints to determine if the revegetation strategy meets requirements of potential ARARs i.e. including but limited to the Surface Mining and Reclamation Act, Article 9 Performance Standards for Revegetation. ARC should use the site specific measurement endpoints to evaluate the test plot data against the criteria and determine if additional action is necessary. EPA suggests ARC work with Vic Claassen to develop criteria that are achievable within the study time frame. The criteria should clearly identify how to assess if the project has achieved acceptable agreed upon levels of diversity and coverage of species that represent recent vegetation surveys at the site.

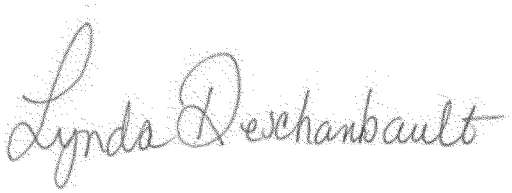
- **S5: Appendix A – Background Information: Revegetation of Mining-Impacted Lands**: This section provides background information from three different mining sites for case study comparison and analysis. However, the three case studies are from mine sites outside of California (Montana and Colorado in the USA, and Ontario, Canada). Please review revegetation case studies from mine sites located in California, ideally within the Sierra Nevada Mountain Range and within closer proximity to the site. For example, ARC should review Hayden Hill and Pine Creek as well as any other available reports.

Attached also please find comments from the U.S. Forest Service and the Lahontan Regional Water Quality Control Board for your full consideration and incorporation.

EPA conditionally approves the Draft Final TSAP and directs ARC to complete this field work during the 2016 Field Season per the comments addressed herein Please provide June, August, and September monitoring reports to EPA with any updates and recommended corrective measures. ARC shall integrate the collected information into the Draft RIFS.

IF you have any questions, please feel free to contact me at (415) 947-4183 or Deschambault.lynda@epa.gov.

Sincerely,



Lynda Deschambault
Remedial Project Manager

Cc by electronic Email:

Douglas Carey, California Regional Water Quality Control Board, Lahontan Region
Lynelle Hart way, Washoe Tribe of Nevada and California
David Friedman, Nevada Department of Environmental Protection
Kenneth Maas, United States Forest Service
Tom Maurer, United States Fish and Wildlife Service
Toby McBride, United States Fish and Wildlife Service
Steve Hampton, California Department of Fish and Wildlife
Marc Lombardi, AMEC

ATTACHMENT A: Table 1. Field plant list and application rates for seeded species and container plants. From Appendix A of the UC Davis Report (Claassen 2015) Revegetation Study.

Seeded Species				
Common Name	Latin Name	Vegetation Type	Seed	proportion
Grasses			lb PLS/ac*	(%)
Basin wild rye	Leymus cinereus	perennial bunch grass	10	27.8
Western needlegrass	Stipa occidentalis	perennial bunch grass	5	13.9
Squirreltail	Elymus elymoides	perennial bunch grass	5	13.9
Blue wild rye	Elymus glaucus	perennial bunch grass	5	13.9
Idaho Fescus	Festuca idahoensis	perennial bunch grass	5	13.9
Shrubs				
Antelope bitterbrush	Purshia tridentata	evergreen shrub	1	2.8
Big sagebrush	Artemisia tridentata	evergreen shrub	1	2.8
Mountain mahogany	Cercocarpus ledifolius	evergreen shrub	1	2.8
Rubber rabbitbrush	Ericameria nauseosus	deciduous shrub	0.5	1.4
Yellow rabbitbrush	Chrysothamnus viscidiflorus	deciduous shrub	0.5	1.4
Forbs				
Showy Penstemon	Penstemon speciousus	perennial herb	0.50	1.4
Yarrow - white	Achillea millefolium	perennial herb	0.25	0.7
Sulfur buckwheat	Eriogonum umbellatum	perennial herb	0.25	0.7
Naked buckwheat	Eriogonum nudum	perennial herb	0.25	0.7
Anderson's, Tahoe or Silver-leaf Lupine	Lupinus argenteus	perennial herb rhizobium inoculated	0.50	1.4
Spur Lupine	Lupinus arbustus	perennial herb rhizobium inoculated	0.25	0.7

Container Plants			
Common Name	Latin Name	Vegetation Type	Plants/ac**
Mountain mahogany	Cercocarpus ledifolius	evergreen shrub inoculated for mycorrhizae and actinomycete at nursery	24
Whitethorn ceanothus	Ceanothus cordulatus	evergreen shrub inoculated for mycorrhizae and actinomycete at nursery	24
Wax Currant	Ribes cereum var cereum	deciduous shrub	24
Jeffrey pine	Pinus jeffreyi	evergreen tree inoculated for mycorrhizae at nursery	48

* Minimum Pure Live Seed weights per acre. Using convenient weighout sizes, the listed total is calculated for 36 lb PLS/ac. In the field, the total of all seeds shall be increased to equal 50 lb PLS per acre using the listed amounts as minimums.

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References Cited:

Butterfield, R.I., 1977, The revegetation potential of Leviathan Mine spoils, Master of Science Thesis, Univ. of Nevada, Reno.

Everett, R.L., Meeuwig, R.O., and Butterfield, R.I., 1980, Revegetation of untreated acid spoils, Leviathan Mine, Alpine County, California, California Geology, 32(1):8-10.

CDOC, 2000, Leviathan Mine Draft Final Revegetation Plan, California Department of Conservation, Office of Mine Reclamation, Sacramento, July.

Claassen, V., 2015, Leviathan Mine Revegetation Evaluation Report. Final Report. Soils and Revegetation, UC Davis. June.

Claassen, V. and Hogan, M., 1999, Soil remediation for partial revegetation of the Leviathan Mine, Alpine County, California, Draft Final Report, prepared for Lahontan Regional Water Quality Control Board, December. Administrative Record item: LM_185354

State Water Resources Control Board, 1991, Memo from Pamela Parker, Nonpoint Source Section, Division of Water Quality, to Jesse Diaz, James Stafford, and Craig Wilson, Subject: Review of March Workshop/Board Meeting Agenda Item. February 6. Administrative Record item: LMDOJ_062139.